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HAWAII'S AKU BOAT FISHERY IN 1986 AND 1987

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INTRODUCTION

Hawaii's traditional aku (skipjack tuna, Katsuwonus pelamis) boat fishery has changed dramatically in recent years following the closure of the cannery in Honolulu in 1984. This report provides information on operations of the pole-and-line (aku boat) fleet in 1986 and 1987. Eight vessels participated in the Honolulu aku boat fishery in 1986 and 1987, and one vessel fished from Maui. By the end of 1987, only six vessels were active in Honolulu. These vessels were selling their catch to four wholesale dealers, one being a cooperative of Honolulu vessels. By mid-1988 conditions had changed again. Good catch levels in 1987 encouraged refurbishment of several vessels and the transfer of the Maui aku boat to Honolulu. In July 1988, there were again eight aku boats fishing on Oahu, but none on Maui.

SAMPLING METHODOLOGY

The data for this report were compiled from shoreside sampling in Honolulu by the Fishery Management Research Program of the Honolulu Laboratory, National Marine Fisheries Service (NMFS), NOAA. An NMFS technician met the aku boats when they off-loaded in Kewalo Basin, Honolulu, usually at night. Receiving permission from the vessel captain, the technician weighed 25 randomly selected fish from the load. Information on the overall size composition of the catch was obtained from the weigh out. Information was also collected on fishing and baiting conditions. The technician monitored the fleet for its overall activity level, marking days on which vessels were tied up for repairs or on which they off-loaded at another port (usually Heeia Kea in Kaneohe, Oahu).

In 1986, we began monitoring the aku boat fleet's landings in mid-March and compiled data on 230 days of landings. In 1987, we monitored landings on 298 days. There was no fishing on some of the remaining calendar days, either because of holidays, bad weather, or seasonal maintenance on the fishing vessels. We adjusted our sampling figures to account for such days. The early days of 1986 were termed "omitted days" while the other fishing days we did not sample were termed "not sampled" (Fig. 1). Therefore, we accounted for 75% of all potential fishing days in 1986 and 91% in 1987. The adjusted proportions between sampled and total days were used as the basis for extrapolation.

ESTIMATES OF FLEET LANDINGS

Our shoreside sampling program provides different levels of detail based on our ability to observe vessel activity. Estimates of annual totals are extrapolations of our samples. Accounting for the difference between the sample period and the activity of the entire fishery differs based on the period of aggregation. Because of the strongly seasonal nature of landings, estimates based on simple annual extrapolations tend to differ from those based on monthly extrapolations. Table 1 provides estimates based on annual and monthly extrapolations for 1986 and 1987, while Table 2

provides estimates based only on monthly extrapolations. Annual totals used throughout the remainder of this report are based on monthly extrapolations.

Some Oahu-based aku boats did not off-load all their catch at Kewalo Basin: Information on these missing landings was obtained when possible, but if this was not possible, we expanded the estimates as best as possible. Estimates were also expanded to account for landings by the Maui vessel. Because of sinkings and extended repair periods, we needed to calculate the "full-time equivalent" (FTE) number of boats fishing each month (two boats which fished half the year each would equate to one FTE vessel). However, since the aku boat fleet is composed of two classes of vessels (Uchida 1976), we also had to correct for the difference between classes. Both classes of vessels took approximately the same number of trips, but the smaller Class I vessels caught only 75% as much aku as the larger Class II vessels. Taking FTE and class considerations into account, the FTE number of aku boats was 8.4 vessels in 1986 and 7.7 vessels in 1987. This adjustment is also used in our extrapolations of trips and landings.

The aku boat fleet took approximately 930 trips in 1986 and 997 trips in 1987, i.e., 111 trips per vessel in 1986 and 129 trips per vessel in 1987. A number of boats took many fewer trips because of breakdowns, repairs, and sinking, while a few boats took over 150 trips each year.

Aku boat landings in 1986 were an estimated 2.2 million lb (977 metric tons (t)), of which 97% were aku. Landings in 1987 were an estimated 3.6 million lb (1,647 t), of which 96% were aku (Fig. 2). Thus, total catch per trip in 1987 was substantially more (57%) than in 1986 (Fig. 3). Furthermore, 18.9% of the monitored trips in 1986 and 12.4% of the trips in 1987 were zero-catch trips, and an additional 14.0% of the trips in 1986 and 14.8% of the trips in 1987 landed <1,000 lb. Therefore, total catch per effective trip (landings in excess of 1,000 lb) amounted to 3,200 lb in 1986 and 4,800 lb in 1987.

The long-term trend in landings from State of Hawaii Division of Aquatic Resources (HDAR) figures on pole-and-line (aku boat) landings of aku is shown in Figure 4 (Table 3). Data are not yet available from HDAR on landings by gear type for 1987. We have estimated the aku boat share of HDAR aku landings for 1987 from preliminary HDAR information on skipjack tuna landings by all gear types.

For some of Hawaii's fisheries, underreporting of landings to HDAR has appeared to be a problem. However, the NMFS estimates of 1986 aku boat landings of aku differ by <0.5% from HDAR figures. The HDAR recorded 943 aku boat trips in 1986. This figure exceeds slightly (1.4%) our estimate of total trips. In other words, at least for 1986, underreporting does not seem to be a problem for Hawaii's aku boat fleet.

SIZE DISTRIBUTION OF AKU

One important purpose for monitoring the fishery is to examine the size distribution of the catch. Large aku are highly valued because they have a

high recovery rate (usable product yield) in processing. All the catch is now sold on the fresh fish market in Hawaii, where it competes with aku imported from Japan and with other tuna species, such as yellowfin tuna. Imports of aku were approximately 600,000 lb in 1986, half as loins and half in the round (NMFS 1986). Imports were only 300,000 lb in 1987, when local supply of tuna was greater (NMFS 1987).

Large aku (>15 lb) provided a high proportion (47%) of total landings (by weight) in 1986, but only 27% in 1987 (Fig. 5). Medium-sized aku (8-14 lb) comprised the bulk of the remaining catch (36% in 1986 and 55% in 1987), while the percentage of small and extra small (< 8 lb) aku was <20% combined in either year. The size composition in 1986 and 1987 can be contrasted to long-term trends (Fig. 6) in which 51% of the landings were in the large category (Hudgins 1986).

SEASONALITY

The aku fishery has long had a strong seasonal component, with big runs in the summer when a high proportion of large aku are landed. However, with the closure of Hawaii's cannery, selling big loads of aku has become extremely difficult. Therefore, the seasonal pattern is no longer as clear, with vessels returning home once a marketable quantity is caught.

The seasonal pattern of aku boat trips in 1986 and 1987 is shown in Figure 7, and the seasonal patterns of aku landings are shown in Figures 8-10. These figures are constructed from data for monitored aku boats only. Estimates for January and February 1986 are based on HDAR data. A seasonal peak of large aku is shown for 1986, but it is markedly lacking in 1987. However, total catch per trip was substantially higher in some months of 1987.

REVENUE

The average price for aku was $0.99/lb in 1986 and $1.15/lb in 1987 (HDAR data). Large aku bring a premium price, approximately 10% above the average price, while small sizes are discounted substantially. Since all of the aku is now being sold on the fresh fish market, there may be increased downward price pressure during good years. However, fishing effort is, to a certain extent, coordinated to avoid flooding the market on any particular day.

Total revenue for the aku boat fleet is estimated at $2.2 million in 1986 and $4.2 million in 1987. This amounts to approximately $540,000 per boat (FTE) in 1987. Using operating cost and characteristics information collected in previous years (Pooley 1987), net economic returns per vessel were approximately $37,000 in 1987, with crew share amounting to $280,000 (Table 4). This is a dramatic turnaround from previous years in which net returns have been consistently negative and crew shares insufficient to maintain crew levels. Higher fish prices, higher percentage of large aku

in the catch, higher total landings, and lower fuel costs are the sources of this apparent improvement.

CONCLUSION

Clearly the future of the aku fishery remains in doubt. Some vessels are operating quite effectively while others are having a hard time recovering from the very lean years just before and after the closure of the cannery. Hudgins (1987) predicted that, if the cannery closed, the fleet would dwindle to four or five active vessels landing 1.8 million lb at $1.25-1.75/lb. This seems to be the case, although landings have increased from their all-time low of 2.1 million lb in 1985. Furthermore, efforts are being made to expand the marketing of aku and provide a greater chance for more vessels to operate profitably.

REFERENCES

Hudgins, L. L.
1986. Economic issues of the size distribution of fish caught in the Hawaiian skipjack tuna fishery, 1964-82. Southwest Fish. Cent. Honolulu Lab. Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96822-2396. Southwest Fish. Cent. Admin. Rep. H-86-14, 16 p.

1987. Economic prospects for Hawaii's skipjack tuna industry. In C. H. Boggs and S. G. Pooley (editors), Forces of change in Hawaii's aku (skipjack tuna) industry, 1986 workshop summary, p. 39-42. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC-72.

National Marine Fisheries Service.
1986. Summary report: Hawaii 1986 fishery products imports. Statistics and Market News, P. O. Box 3266, Terminal Island, CA 90731, 16 p.

1987. Summary report: Hawaii 1987 fishery products imports. Statistics and Market News, P. O. Box 3266, Terminal Island, CA 90731, 15 p.

Pooley, S. G.
1987. Economic profile of Hawaii's aku fleet. In C. H. Boggs and S. G. Pooley (editors), Forces of change in Hawaii's aku (skipjack tuna) industry, 1986 workshop summary, p. 31-37. U.S. Dep. Commer., NOAA Tech. Memo. NMFS, NOAA-TM-NMFS-SWFC-72.

Uchida, R. N.
1976. Reevaluating of fishing effort and apparent abundance in the Hawaiian fishery for skipjack tuna, Katsuwonus pelamis, 1948-70. Fish. Bull., U.S. 74:59-69.

Table 1.--Estimates of Hawaii aku boat (pole-and-line) activity, 1986 and 1987. Revenue is based on prices from the Hawaii Division of Aquatic Resources data.

Aku boat parameters	Monthly basis extrapolation		Annual basis extrapolation	
	1986	1987	1986	1987
Vessels (No.)	8.4	7.7	8.4	7.7
Trips (No.)	930	997	955	1,113
Landings (lb)				
Aku	2,086,032	3,480,901	2,468,013	3,522,138
Total	2,153,194	3,631,157	2,538,260	3,672,240
Catch per trip (aku)	2,243	3,491	2,585	3,164
Catch per trip (total)	2,315	3,642	2,658	3,299
Estimated revenue				
Aku	2,073,327	4,003,036	2,452,981	4,050,458
Total (US$)	2,161,769	4,218,152	2,548,368	4,265,877
Aku (US$/lb)	0.99	1.15	0.99	1.15
Total (US$/lb)	1.00	1.16	1.00	1.16

Size composition (%)

		Large	Medium	Small	Extra small
As sampled	1986	50.5	33.1	7.2	9.2
	1987	28.5	53.4	14.6	3.5
As expanded	1986	46.6	35.7	7.8	9.9
	1987	26.7	54.8	15.0	3.6

Table 2.--Estimates of monthly Hawaii aku boat landings, 1986 and 1987.

Month	Trips (No.)	Total catch (lb)	Aku catch (lb)	Aku catch		
				Pounds/ trip	Large (lb)	Sampled (%) Large
			1986			
Jan.	71.0	38,504	37,081	522	4,441	N/A
Feb.	67.1	99,592	99,579	1,485	4,898	N/A
Mar.	82.1	63,178	46,670	569	2,296	4.9
Apr.	61.1	81,647	69,349	1,134	3,543	5.1
May	86.1	237,490	228,408	2,654	95,470	41.8
June	79.2	268,720	268,292	3,387	191,135	71.2
July	89.9	296,841	296,103	3,293	218,388	73.8
Aug.	107.2	342,835	339,908	3,172	264,573	77.8
Sept.	90.3	252,782	250,012	2,768	102,964	41.2
Oct.	57.3	156,523	144,402	2,519	44,679	30.9
Nov.	38.5	55,013	49,162	1,276	3,340	6.8
Dec.	100.3	260,070	257,065	2,562	36,640	14.3
Total	930.2	2,153,194	2,086,032	2,243	972,368	50.5
			1987			
Jan.	103.4	281,389	270,992	2,620	105,863	39.1
Feb.	83.9	361,717	361,670	4,312	122,166	33.8
Mar.	62.0	245,955	244,286	3,937	114,216	46.8
Apr.	61.9	159,869	151,344	2,444	31,772	25.6
May	74.7	368,467	357,634	4,785	24,622	14.1
June	85.3	272,115	269,567	3,158	65,199	24.4
July	103.7	332,602	321,210	3,098	98,797	29.1
Aug.	118.7	477,307	468,908	3,952	157,316	34.5
Sept.	93.3	269,379	267,508	2,867	70,363	27.1
Oct.	75.4	272,972	268,716	3,565	21,658	8.1
Nov.	55.8	192,611	148,184	2,656	33,920	26.4
Dec.	79.2	396,775	350,884	4,429	4,507	12.0
Total	997.4	3,631,157	3,480,901	3,490	842,400	28.5

Table 3.--Aku boat landings, 1970-87, based on data from the Hawaii Division of Aquatic Resources.

Year	Trips (No.)	Aku			Price[a] (US$)	Aku/trip (lb)	Total catch/ trip (lb)
		Pounds	Revenue (US$)	Price (US$/lb)			
1970	1,915	7,313,687	1,487,385	0.20	0.58	3,819	3,857
1971	1,990	13,310,347	2,744,008	0.21	0.56	6,689	6,730
1972	1,878	10,879,658	2,938,049	0.27	0.72	5,793	5,858
1973	1,924	10,693,039	3,186,488	0.30	0.76	5,558	5,596
1974	2,039	7,328,076	2,635,891	0.36	0.82	3,594	3,642
1975	1,974	4,979,154	2,256,198	0.45	0.95	2,522	2,578
1976	2,077	9,733,154	3,797,718	0.39	0.78	4,686	4,765
1977	1,767	6,671,721	3,669,914	0.48	0.91	4,342	4,403
1978	1,857	6,643,636	4,274,413	0.64	1.14	3,578	3,688
1979	1,477	6,378,902	4,533,781	0.71	1.13	4,319	4,422
1980	1,113	3,923,646	3,071,548	0.78	1.11	3,525	3,735
1981	1,108	4,009,446	3,225,458	0.80	1.04	3,619	3,817
1982	1,069	3,086,057	2,503,678	0.81	0.99	2,887	3,126
1983	1,346	2,539,205	2,436,736	0.96	1.13	1,886	1,993
1984	1,264	3,387,197	2,696,637	0.80	0.91	2,680	2,787
1985	927	1,880,520	2,118,313	1.13	1.22	2,029	2,280
1986	943	2,075,472	2,062,816	0.99	1.05	2,201	2,485
1987[b]	--	3,055,505	3,515,347	1.15	1.15	--[c]	--[c]

[a]Inflation-adjusted price to 1987 Honolulu consumer price index levels.
[b]Estimated from preliminary data.
[c]Data are not available.

Table 4.--Hawaii aku boat financial position, 1983, 1986, and 1987.

Characteristics	Hypothetical economic returns (US$)			
	1983	1983[a]	1986[b]	1987
Revenue	302,875	357,105	256,965	540,291
Fixed costs	64,698	76,282	76,282	76,282
Operating costs				
Fuel	71,030	62,279	48,007	55,792
Other	14,013	16,522	12,736	14,801
Crew share	129,610	165,591	116,752	279,470
Other costs	43,340	51,100	36,770	77,312
Total cost	322,691	371,774	290,547	503,657
Net revenue	-19,816	-14,669	-33,582	36,633
Operating characteristics				
Trips (No.)	144	144	111	129
Catch per trip (lb)	2,565	2,565	2,315	3,642
Price (US$)	1	0.97	1.00	1
Crew share (%)	0.60	1	0.60	0.60
Other (%)	0.14	0.14	0.14	0.14
Honolulu consumer price index[c]	276	1.18	325	325
Fuel price index	382	0.88	335	355

[a]1983 catch characteristics with 1987 input prices.
[b]1986 catch characteristics with 1987 input prices.
[c]Honolulu consumer price index (100 = 1967).

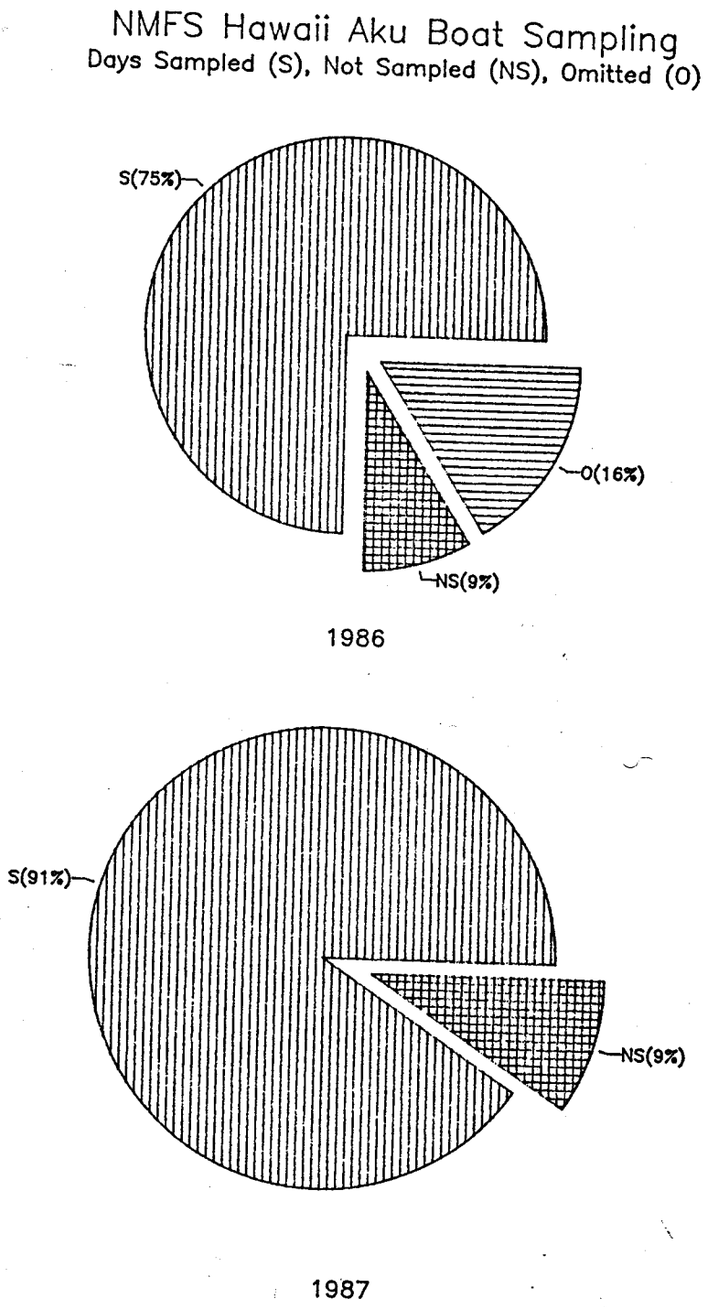

Figure 1.--Percentage of potential Hawaii aku boat fishing days sampled by the National Marine Fisheries Service (NMFS), 1986 and 1987 (days sampled (S), days not sampled (NS), days omitted from sampling period (O)).

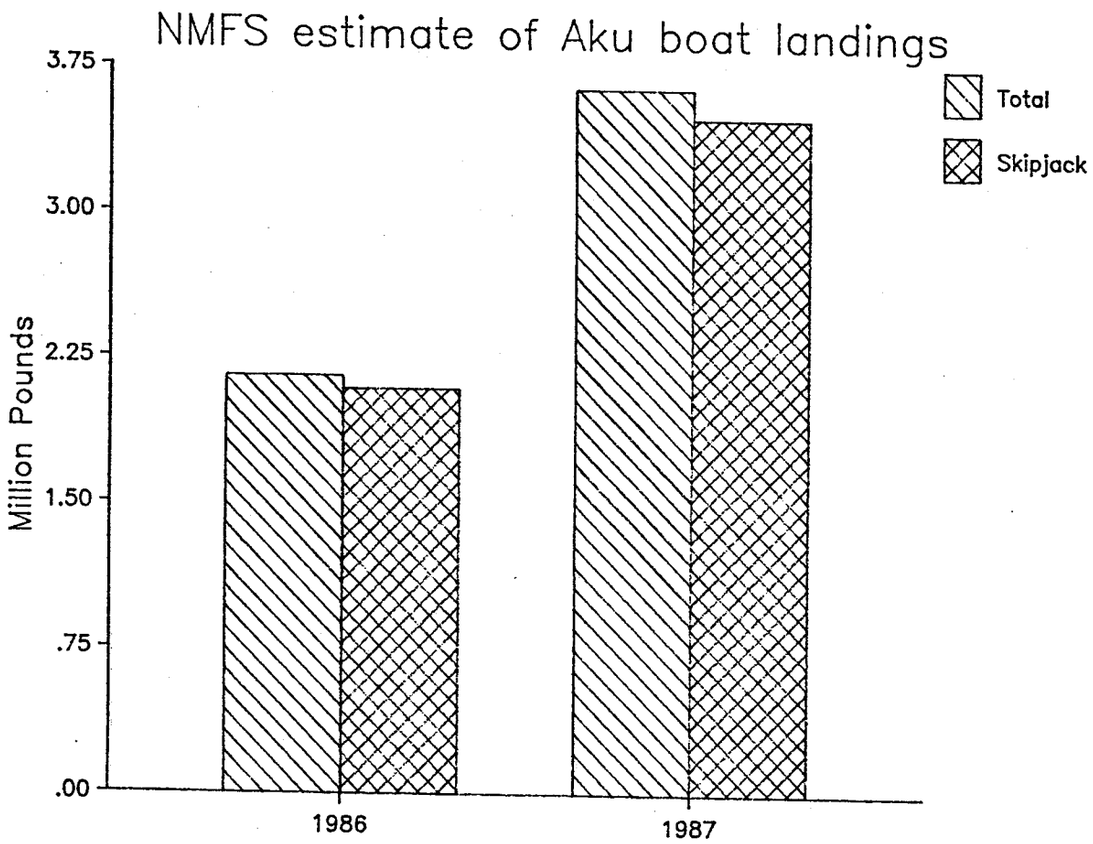

Figure 2.--Estimate of Hawaii aku boat landings, 1986 and 1987. Total landings and landings of skipjack tuna (million pounds).

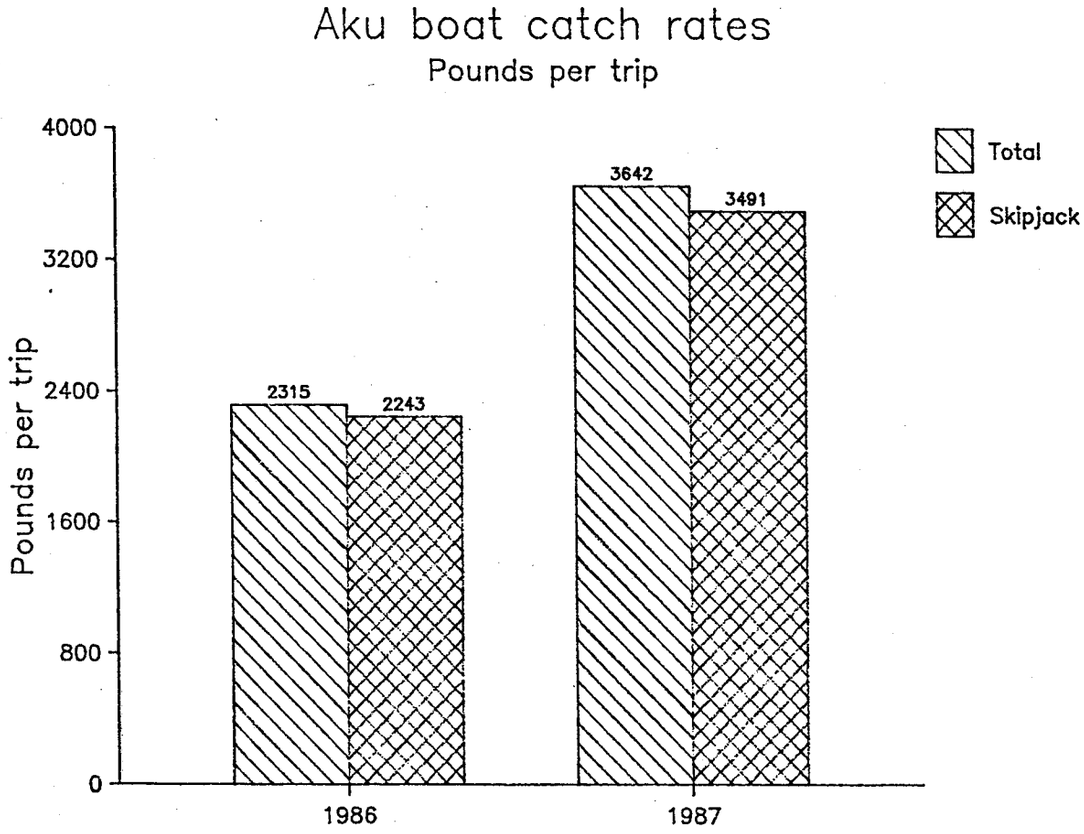

Figure 3.--Catch rates for Hawaii aku boats, 1986 and 1987. Total pounds and skipjack tuna pounds per trip.

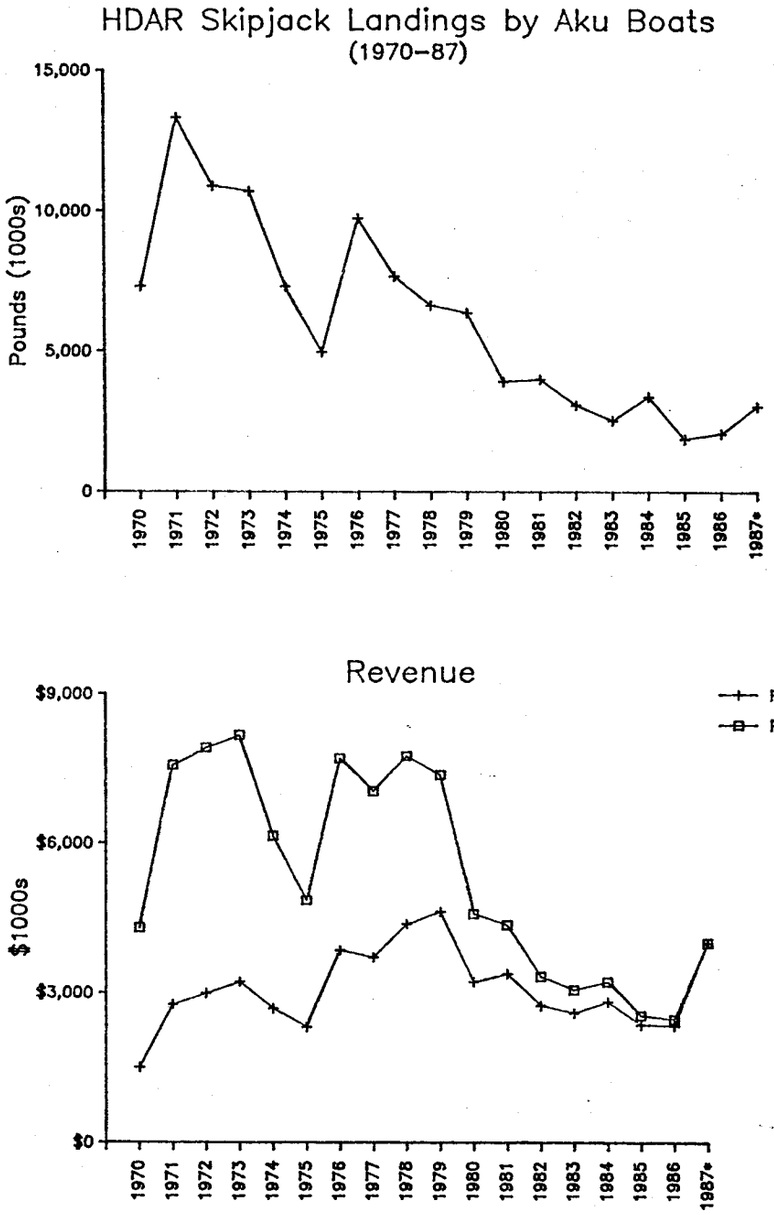

Figure 4.--State of Hawaii (Division of Aquatic Resources) figures on aku boat landings and revenue, 1970-87. Landings in 1,000 lb. Revenue in $1,000. Revenue presented in actual prices (REV) and inflation-adjusted prices (REV*), with 1987 base level.

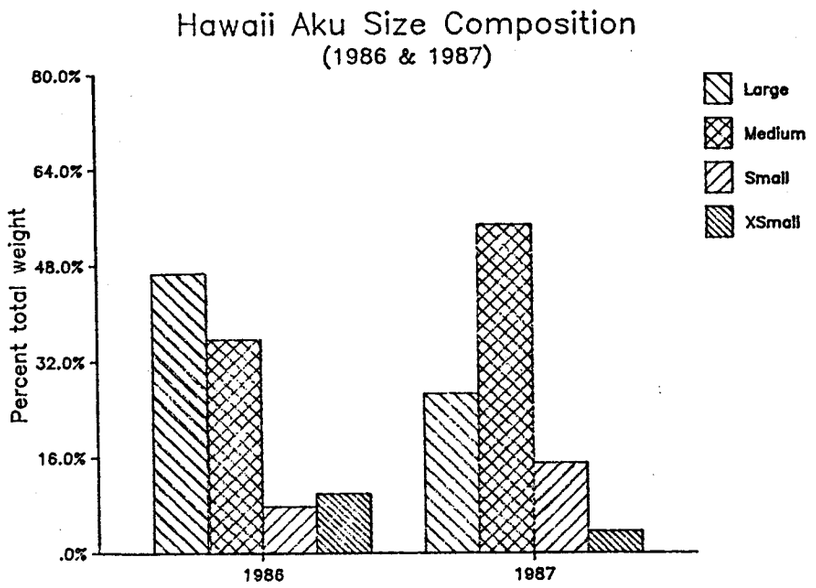

Figure 5.--Hawaii aku size composition, 1986 and 1987. Percent of total weight by size category.

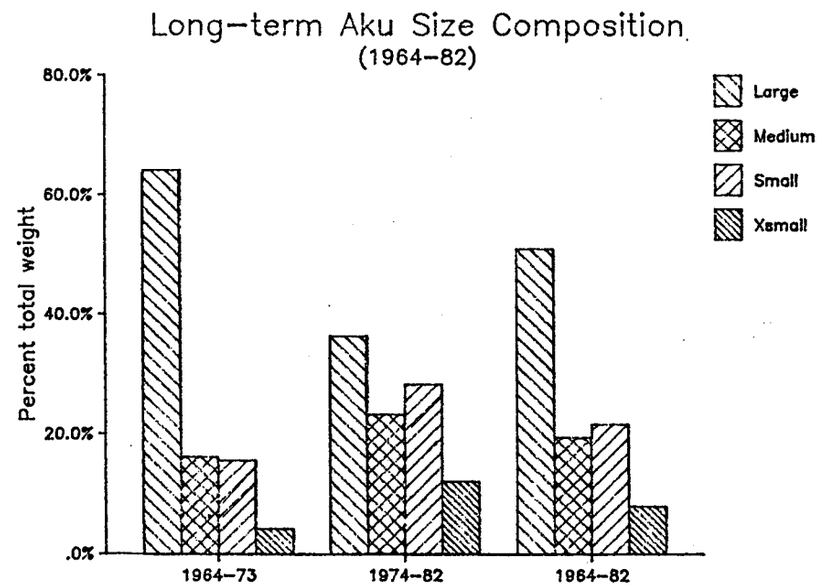

Figure 6.--Long-term Hawaii aku size composition, 1964-82. Percent of total weight by size category (Source: Hudgins 1986).

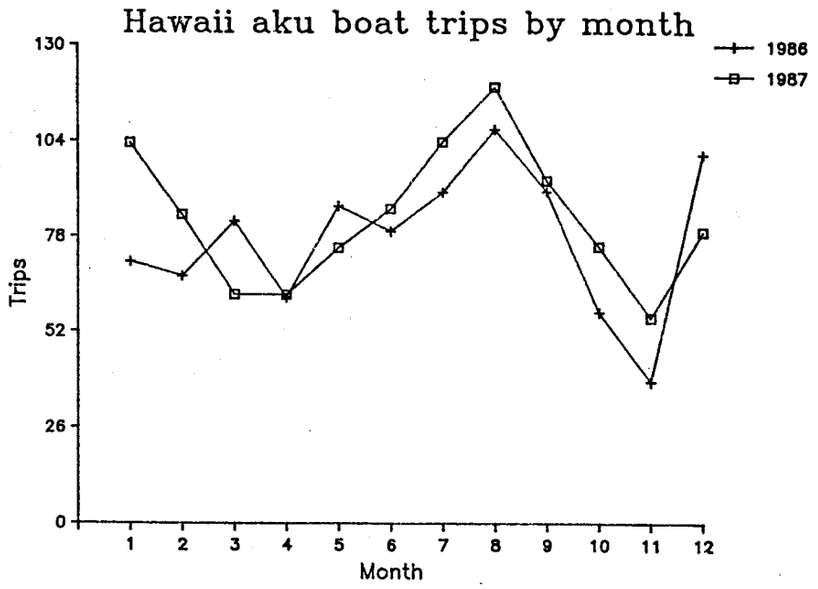

Figure 7.--Hawaii aku boat trips by month, 1986 and 1987.

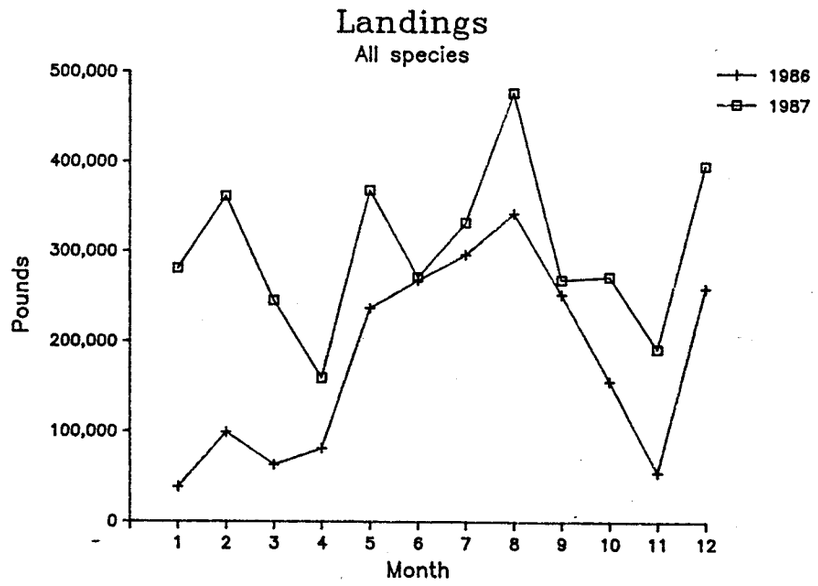

Figure 8.--Hawaii aku boat landings (all species) by month, 1986 and 1987.

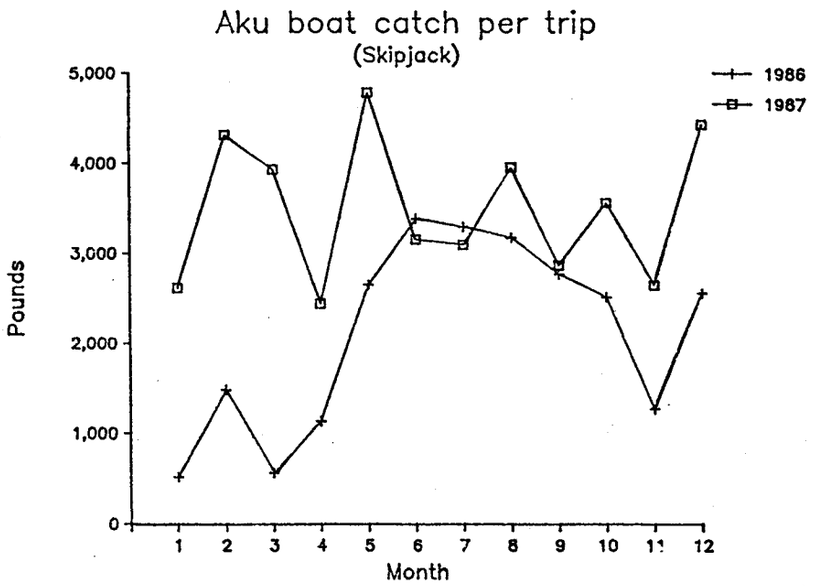

Figure 9.--Hawaii aku boat catch rate (skipjack tuna only) per trip, 1986 and 1987.

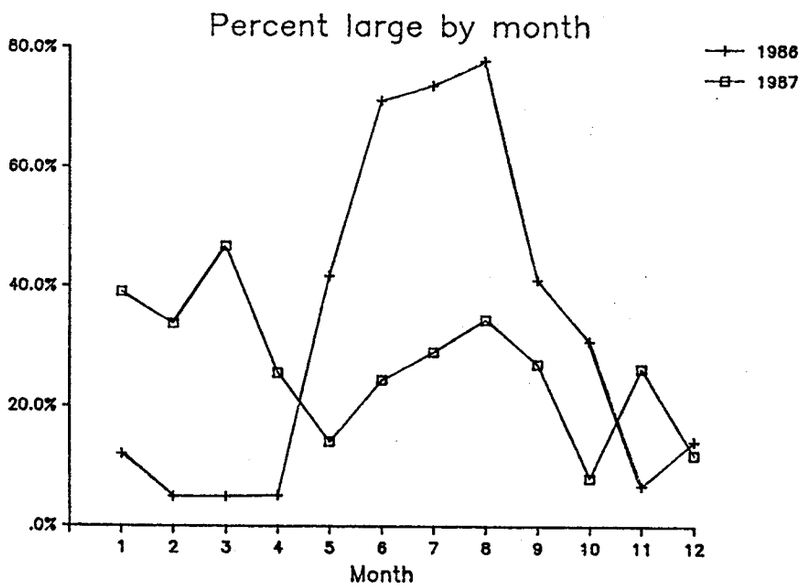

Figure 10.--Percent large skipjack tuna by month, Hawaii aku boat fleet, 1986 and 1987. Percent of total weight by size category.